EXPRESS MAIL NO. EV064844906US

FORM PTO-1390 (REV 11-2000) DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NO.
970054.414USPC

U.S. APPLICATION NO. (If known, see37 CFR 1.5)
Unknown 10/088947

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP00/06765	**15 July 2000 (15.07.00)**	**30 September 1999 (30.09.99)**

TITLE OF INVENTION
LANDING STAGE

APPLICANT(S) FOR DO/EO/US
WOBBEN, Aloys

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☐ is attached hereto (required only if not communicated by the International Bureau).
   b. ☒ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☒ is attached hereto
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☒ A English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.
14. ☐ A SECOND or SUBSEQUENT preliminary amendment.
15. ☒ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 – 1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4)
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☐ Other items of information:

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
Unknown 10/088947	**PCT/EP00/06765**	**970054.414USPC**

21. ☒ The following fees are submitted:

Basic National Fee (37 CFR 1.492(a)(1)-(5)):

Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO $1040.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO $890.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO $740.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4)..... $710.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) $100.00

	CALCULATIONS PTO USE ONLY	
ENTER APPROPRIATE BASIC FEE AMOUNT =	$890.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☒ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$130.00	

Claims	Number Filed	Number Extra	Rate		
Total Claims	12 - 20 =	0	x $ 18.00	$0.00	
Independent Claims	1 - 3 =	0	x $ 84.00	$0.00	
Multiple dependent claim(s) (if applicable)			+ $280.00	$0.00	
TOTAL OF ABOVE CALCULATIONS =				$1,020.00	
☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				$.00	
SUBTOTAL =				$.00	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$.00	
TOTAL NATIONAL FEE =				$1,020.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40.00 per property +				$0.00	
TOTAL FEES ENCLOSED =				**$1,020.00**	
				Amount to be refunded:	
				charged	

a. ☒ A check in the amount of $1,020.00 cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. in the amount of $_ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **19-1090**. A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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United States of America
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SIGNATURE

David V. Carlson
NAME

31,153
REGISTRATION NUMBER

IN THE UNITED STATES PATENT AND TRADE MARK OFFICE

VERIFICATION OF TRANSLATION

I, Michael Wallace Richard Turner, Bachelor of Arts, Chartered Patent Attorney, European Patent Attorney, of 1 Horsefair Mews, Romsey, Hampshire SO51 8JG, England, do hereby declare that I am conversant with the English and German languages and that I am a competent translator thereof;

I verify that the attached English translation is a true and correct translation made by me of the attached specification in the German language of International Application PCT/EP00/06765;

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: February 26, 2002

M W R Turner

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JC13 Rec'd PCT/PTO 22 MAR 2002

PATENT COOPERATION TREATY

Int'l Application No.	:	PCT/EP00/06765
Int'l Filing Date	:	15 July 2000
U.S. Application No.	:	Not yet known
Inventors	:	WOBBEN, Aloys
Title	:	LANDING STAGE
Docket No.	:	970054.414USPC
Date	:	22 March 2002

Box PCT
Assistant Commissioner for Patents
Washington, DC 20231-0001

PRELIMINARY AMENDMENT

Sir:

Please enter a Preliminary Amendment by replacing the application and claims presently on file as identified above with the enclosed substitute specification and claims prior to examination on the merits.

Respectfully submitted,

Seed Intellectual Property Law Group PLLC

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DVC:km

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Aloys Wobben, Argestrasse 19, 16607 Aurich

Landing stage

The present invention concerns a landing stage, in particular for offshore wind power installations, as set forth in claim 1.

Offshore wind power installations usually require a landing stage or landing pier so that craft, in particular ships, can guarantee supply and transportation services. In the case of small offshore installations, these are usually simple jetties with possible ways of making boats fast. In the case of larger offshore installations at which larger supply ships land, the landing installations are of a more expensive and complicated structure and have for example supply intermediate storage facilities such as fuel tanks and loading equipment such as cranes.

Helicopters, because of their lower service load capacity, are usually employed for the rapid transportation of personnel.

If, because of high wind speeds and a heavy sea, it is difficult for ships to land, to the point of being impossible, then helicopters temporarily represent the only supply and transportation option. Many offshore installations which do not have any landing area for helicopters, under such weather conditions, can then be supplied with a helicopter only in such a way that the helicopter which has flown to the installation remains in the air and supply or inspection is effected for example by means of a cable winch on the helicopter. Manoeuvres of that kind are difficult and dangerous.

Offshore wind parks comprising a plurality of individual wind power installations which are disposed in the sea but also other, for example small, individual offshore installations, by virtue of their construction, afford scarcely any possible way of providing a landing area for helicopters on them. In addition, in the case of wind power installations, the danger to the helicopter as it flies towards the installation, due to the rotating rotor blades of the wind power installation, represents an addition serious problem.

The separate arrangement of the mooring location or berth for ships on the foundation legs and of the landing area for the helicopter at a higher position on the drilling rig, as is known from offshore drilling rigs, is essentially out of the question, because of the rotor being arranged at that location in the case of wind power installations, and, under the constricted situation in terms of space on offshore installations, because of separately required logistics and the respective space required for same, results in a disadvantageous waste of building space.

The object of the present invention is to provide a landing stage for ships and for helicopters, which while being of a simple structure can be used on offshore and shore installations.

That object is attained by a landing stage having the features set forth in claim 1. Advantageous configurations of the invention are set out in the appendant claims.

In accordance with the invention a landing stage has a mooring location or berth for ships and a landing area for helicopters. The landing stage is disposed in particular on offshore wind power installations, but also on installations which are erected on a bank or shore. In accordance with the invention in that case there is a common route link from the mooring location and the landing area to the installation. In that way, in accordance with the invention, logistical devices can be set up in such a way that they can be used jointly for the mooring location and the landing area. These are for example buildings in which landed people can (initially) seek protection, materials which have been landed or which are ready for collection can be held in intermediate store, but also fuel stores which are arranged together as well as navigational aids which can include signal navigation lights, radio direction-finding transmitters, but also pilot rooms with radar surveillance. Because in particular offshore installations of any kind are substantially basically highly restricted in terms of their space aspects, a concentration in accordance with the invention of logistically relevant locations (transport interface for ships and helicopters from the installation to the outside world) is extremely advantageous. The common landing stage, preferably with the jointly usable logistical devices, advantageously concentrates in

accordance with the invention transport from the landing stage by way of the common route link to the installation where then further distribution from the common route link can be effected in any desired manner in a logistically simply plannable fashion.

The landing stage according to the invention is preferably mounted to an offshore wind power installation whose generator is driven by a rotor which rotates at the tip (pod) of a pylon about a horizontal axis. In that case the landing area for helicopters, in order to guarantee safe take-offs and landings, is remote from the pylon preferably by at least a third of the length of a rotor blade.

Preferably the landing stage according to the invention has independent foundations in the sea, that is to say the mooring location and the landing area are supported on a foundation on the seabed or supported floatingly on the surface of the water, more specifically individually or separately from each other and in then any combination of the kind of support.

Preferably the landing stage is disposed laterally of the installation at the prevailing lee side of the installation. In that way the landing stage is advantageously disposed in the region of the installation which is sheltered from the wind, so that both wind and also sea swell break against the installation and only act with an alleviated force on the landing stage.

In accordance with the invention, that effect is further enhanced if the landing stage is preferably mounted rotatably about the offshore installation and is thus always oriented into the lee side of the installation by the afflux flow of wind. Particularly suitable for this embodiment of the invention is the floating foundation for the landing stage, which for example can be in the form of a pontoon of large area, which can be connected by way of a bridge for example to the base region of an offshore wind power installation and then is supported there for example by means of a ring sleeve or a rotor member on the periphery of the base. When applied to wind power installations, that design configuration has an additional substantial advantage: the greatly projecting rotating rotor blades of the generator propeller represent a major danger to a helicopter flying towards

the installation. If now however in accordance with the invention the landing stage is oriented by the wind into the lee side of the wind power installation, the air space above the landing stage is at any event outside the rotational range of the generator propeller for the latter is in accordance with its function oriented transversely with respect to the lee side against the wind - in other words: in relation to the wind direction, the plane of rotary movement of the generator propeller is then perpendicularly markedly upstream of the air space above the landing stage and does not cut through the air space. Furthermore, the helicopter can advantageously come in to land on the landing area against the wind without being impeded by the installation.

The embodiment of the landing stage according to the invention with the floating foundation also has the advantage that in respect of its height it follows the movement of the tides, which is of substantial advantage for the mooring location of the ships.

The landing stage according to the invention is preferably a structure made up of any combination of steel framework, plates, concrete and/or wood with suitable corrosion protection in relation to sea water and other environmental influences.

Preferred embodiments of the invention are described hereinafter with reference to the accompanying drawings in which:

Figure 1 shows a side view of a first embodiment of the present invention, and

Figure 2 shows a side view of a second embodiment of the present invention.

In the two Figures, identical components or components which correspond to each other in any way are denoted by the same references. With reference to Figures 1 and 2, shown therein is an offshore wind power installation 2 with a rotor 4 with a substantially horizontal axis of rotation. The rotor 4 is connected or coupled to a generator (not shown) in a pod 6. The pod 6 (or the illustrated machine housing) can be oriented about a vertical axis 8 with respect to the current wind direction 9 by a transmission arrangement (not shown) which is also arranged in the pod.

The pod 6 with the rotor 4 is mounted on the tip of a pylon 10 rotatably about the axis 8.

The pylon 10 of the wind power installation 2 is fixedly erected in the sea 12 as shown in Figure 1 by means of a foundation 14a of concrete and as shown in Figure 2 by means of lateral struts 14b on the seabed 16.

The wind power installations 2 shown in both Figure 1 and also Figure 2 each have a landing stage 20a, 20b. The landing stage 20a shown in Figure 2 is in the form of a steel framework structure with a concrete platform 22 and is secured fixedly to the pylon 10 of the wind power installation 2 laterally of the installation 2 and is fixedly supported by way of a steel lattice pillar 24 itself in the sea 12 on the seabed 16.

The horizontal concrete platform 22 at the top side forms a landing area 25 for a helicopter 26. In particular at the edge 28 of the platform 22, which is most remote from the pylon 10, the platform 22 together with the pillar 24 which projects perpendicularly downwardly from that edge 28 to the seabed 16 forms a mooring location or berth in the form of a pier for ships 30.

Both the landing area 25 for helicopters 26 and also the mooring location 28 for ships 30 are connected by way of the platform 22 which is fixed to the pylon 10 by a common route link 32 between on the one hand the landing area and the mooring location 28 and on the other hand the pylon 10 of the wind power installation 2. Thus, personnel and equipment which are transloaded by means of the helicopter 26 or the ship 30 on the landing stage 20, by way of the common route link 32, follow a common path through a door 34 into the pylon 10 where for example by means of an elevator (not shown) they can be conveyed in the pylon 10 to the pod 6 at the tip thereof, if for example repair or maintenance operations have to be carried out there.

The landing stage 20a, in relation to a prevailing wind direction at the location of the wind power installation 2, is disposed at the lee side thereof and is securely fixed there, as described. In that way, the force of wind and sea swell both against the landing area 25 and also against the

mooring location 28 is broken by the pylon when wind is blowing from the prevailing direction.

Safe take-offs and landings of helicopters 26 on the landing area 25 are guaranteed by a sufficiently large vertical distance between the landing area 25 and the diameter described by the tips of the rotor blades 4.

Referring now to Figure 1 the wind power installation 2 has a landing stage 20b which differs from the landing stage 20a in Figure 2 by the features described hereinafter.

The landing stage 20b shown in Figure 1 is a steel plate/steel framework structure whose concrete platform 22 is supported on a pontoon 36. Disposed in the interior of the pontoon 36 are storage spaces (not shown). The platform 22 whose top side, as already described with reference to Figure 2, forms the landing area 25 for helicopters 26 and whose lateral edges form the mooring location 28 for ships 30, is therefore not fixedly anchored in the sea on the seabed 16 but floats on the surface of the sea 12. As a result, there is always an identical vertical spacing between the platform 22 and the surface of the sea 12, which is of substantial advantage in particular for loading and unloading ships 30.

The platform 22 with the landing area 25 and the mooring location 28 on the floating platform 36 is connected to the pylon 10 of the wind power installation 2 by way of a bridge 32. The bridge 32 thus forms the common route link from the landing area 25 and the mooring location 28 to the pylon 10 of the wind power installation 2. The bridge 32 is supported both on the pontoon 36 and also the pylon 10 firstly pivotably about a respective horizontal axis. Those mounting locations 38 ensure that the floating pontoon 36 is freely enabled to perform vertical movement by virtue of the movement of tides in the sea 12.

The landing stage 20b shown in Figure 1 is also connected by way of the bridge 32 rotatably about the vertical axis 8 of the pylon 10 of the wind power installation 2. In that way the landing stage 20b, connected to the pylon 10 by way of the bridge 32, can float freely at a given spacing around the pylon 10. In that situation it is oriented by the wind direction 9 at the time. That provides firstly that the landing stage 20b is always at the lee

side of the wind power installation 2 - that is to say not only with the prevailing wind direction but with any current wind direction - and is thus always protected by the pylon 10 from the influences of wind and swell. So that the pontoon 36 can float as smoothly as possible on the sea, structural measures are known, for example the pontoon 36 should be as heavy and as of large surface area as possible. A second advantage of the landing stage 20b being oriented by the wind 10 to assume a position in the lee of the wind power installation 2 concerns flight safety when helicopters 26 are taking off from and landing on the landing stage 20b: by virtue of the fact that the propeller 4 of the wind power installation 2 is always oriented in the wind direction 9, the air space above the landing stage 20b, as shown in Figure 1, which is oriented towards the lee side, does not in any case have the rotor blades 4 of the wind power installation 2 passing therethrough. The helicopter 26 can thus take off and land vertically without hindrance and can fly to the landing stage 20b against the wind without being impeded by the wind power installation 2.

The described rotatable support for the landing stage 20b about the pylon 10 is afforded by an annular 'balcony' 40 which is rotatable in the form of a sleeve about a region at the lower end of the pylon 10. The balcony 40 is fixed on the pylon 10 in the vertical direction so that the door 34 in the pylon 10 is at any event always accessible from the balcony 40.

It is possible to see on the landing stage 20b buildings 42 which can be used jointly from the landing area 25 and the mooring location 28 and navigational aids 44.

CLAIMS

1. A landing stage for an offshore wind power installation, comprising
a mooring location (28) for ships (30),
a landing area (25) for helicopters (26), and
a common route link (32) from the mooring location (28) and the landing area (25) to the installation.

2. A landing stage according to claim 1 wherein the mooring location (28) and the landing area (25) in addition to the foundation (14a, 14b) of the installation in the sea have their own foundation (24, 36).

3. A landing stage according to claim 1 or claim 2 wherein the landing stage (20a, b) is arranged at the lee side of the installation (2) in relation to a prevailing wind direction at the location of the installation (2).

4. A landing stage according to one of the preceding claims wherein the foundation (24) of the landing stage (20a) is arranged on the seabed (16).

5. A landing stage according to one of claims 1 to 3 wherein the landing stage (20a, b) is supported floatingly in the sea.

6. A landing stage according to one of the preceding claims wherein the landing stage (20b) is rotatable about the installation (2) about a vertical axis (8).

7. A landing stage according to one of the preceding claims with logistical and/or infrastructural items of equipment (42, 44) which can be jointly used at the mooring location (28) and the landing area (25).

8. A landing stage according to claim 7 wherein the items of equipment are jointly usable buildings (42) for the storage, intermediate

storage and preparation of articles which are transloaded at the mooring location (28) and/or the landing area (25), and/or buildings (42) for means which serve for the supply and/or operation of the craft (26, 30) using the landing stage (20), and/or residential buildings (42) for personnel seeking protection and/or for maintenance personnel, who travel with the craft (26, 30) and/or are used for movement of the craft (26, 30), for example as pilots.

9. A landing stage according to claim 7 or claim 8 wherein the items of equipment are jointly usable navigational aids (44), in particular radio direction-finding transmitters, light signalling installations and/or radar equipment.

10. A landing stage according to one of the preceding claims comprising a concrete platform (22) at the top side, on which the landing area (25) is arranged with the mooring location (28) disposed at the edge thereof.

11. A landing stage according to one of the preceding claims with a steel framework and/or steel plate structure.

12. An offshore wind power installation (2) with a landing stage (20a, 20b) according to one of the preceding claims.

13. An offshore wind power installation according to claim 12 wherein the landing area (25) is horizontally remote from the pylon (10) of the wind power installation (2) by at least two-thirds of the length of a rotor blade (4).

Abstract

Offshore wind power installations usually require a landing stage or landing pier so that craft, in particular ships, can guarantee supply and transportation services. In the case of small offshore installations, these are usually simple jetties with possible ways of making boats fast. In the case of larger offshore installations at which larger supply ships land, the landing installations are of a more expensive and complicated structure and have for example supply intermediate storage facilities such as fuel tanks and loading equipment such as cranes.

The object of the present invention is to provide a landing stage for ships and for helicopters, which while being of a simple structure can be used on offshore and shore installations.

A landing stage for an offshore wind power installation, comprising

a mooring location (28) for ships (30),

a landing area (25) for helicopters (26), and

a common route link (32) from the mooring location (28) and the landing area (25) to the installation.

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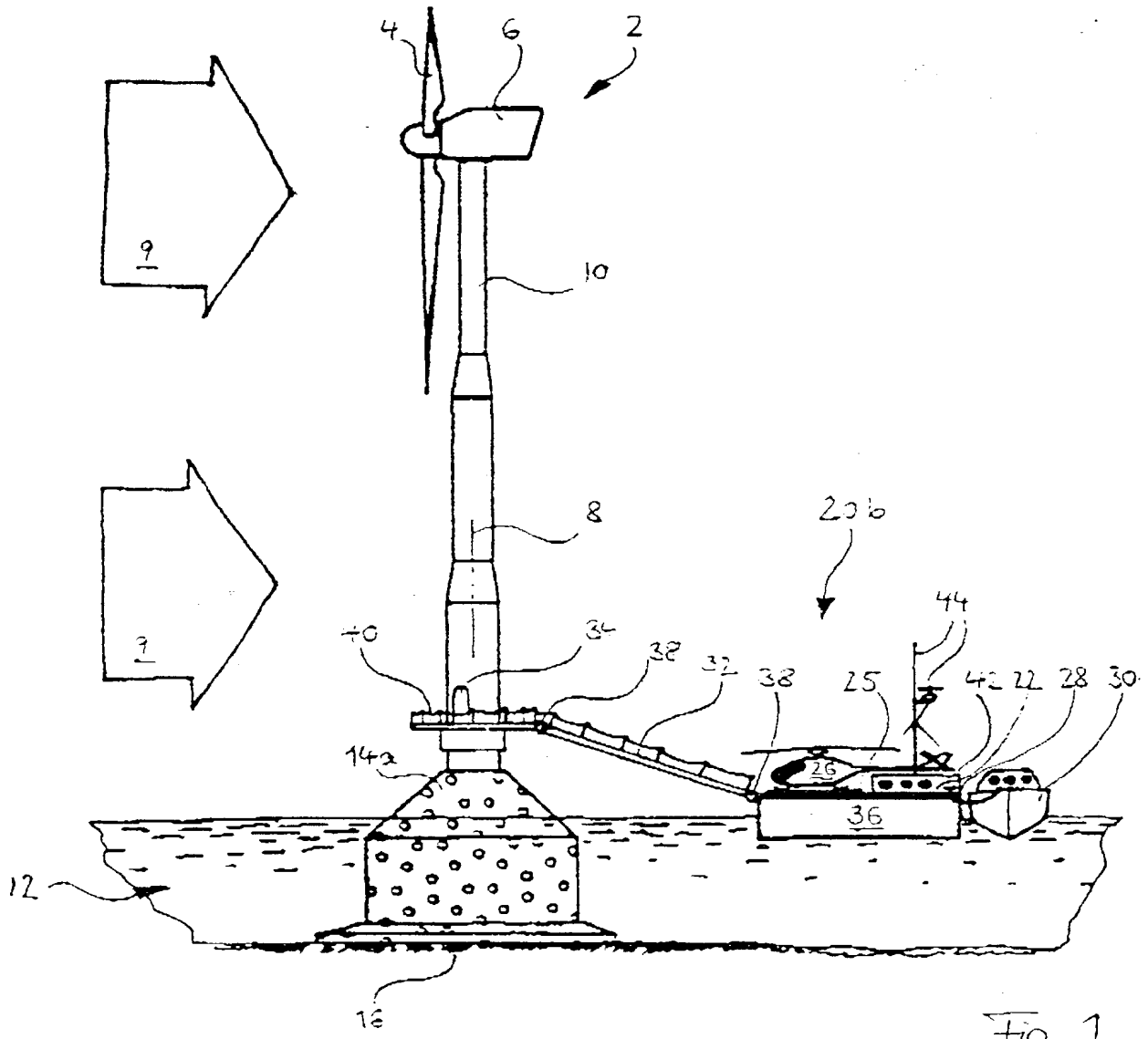

Fig. 1

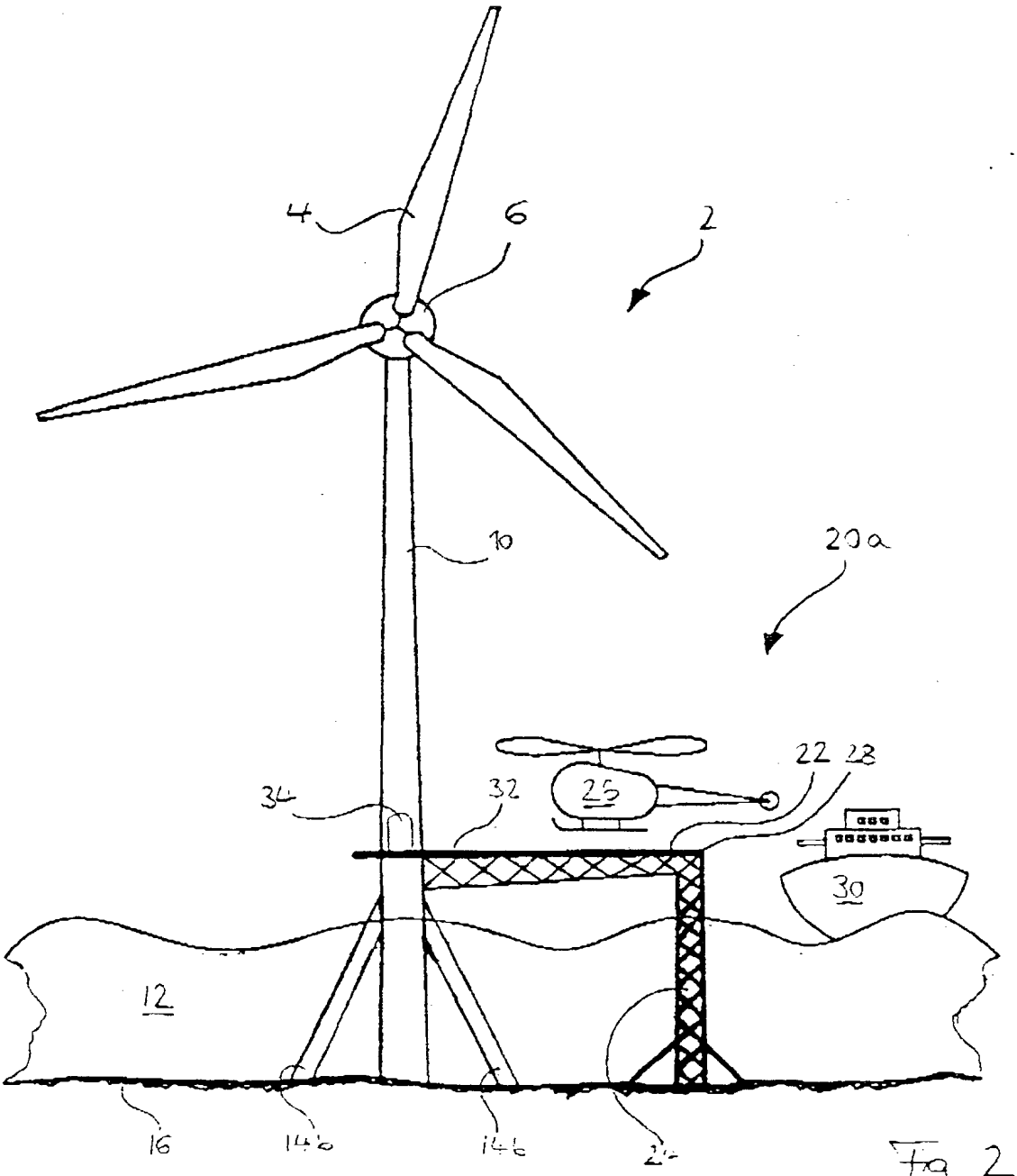

Fig 2

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LANDING STAGE

TECHNICAL FIELD

The present invention concerns a landing stage, in particular for offshore wind power installations.

BACKGROUND OF THE INVENTION

Offshore wind power installations usually require a landing stage or landing pier so that craft, in particular ships, can guarantee supply and transportation services. In the case of small offshore installations, these are usually simple jetties with possible ways of making boats fast. In the case of larger offshore installations at which larger supply ships land, the landing installations are of a more expensive and complicated structure and have for example supply intermediate storage facilities such as fuel tanks and loading equipment such as cranes.

Helicopters, because of their lower service load capacity, are usually employed for the rapid transportation of personnel.

If, because of high wind speeds and a heavy sea, it is difficult for ships to land, to the point of being impossible, then helicopters temporarily represent the only supply and transportation option. Many offshore installations which do not have any landing area for helicopters, under such weather conditions, can then be supplied with a helicopter only in such a way that the helicopter which has flown to the installation remains in the air and supply or inspection is effected for example by means of a cable winch on the helicopter. Maneuvers of that kind are difficult and dangerous.

Offshore wind parks comprising a plurality of individual wind power installations which are disposed in the sea but also other, for example small, individual offshore installations, by virtue of their construction, afford scarcely any

possible way of providing a landing area for helicopters on them. In addition, in the case of wind power installations, the danger to the helicopter as it flies towards the installation, due to the rotating rotor blades of the wind power installation, represents an addition serious problem.

The separate arrangement of the mooring location or berth for ships on the foundation legs and of the landing area for the helicopter at a higher position on the drilling rig, as is known from offshore drilling rigs, is essentially out of the question, because of the rotor being arranged at that location in the case of wind power installations, and, under the constricted situation in terms of space on offshore installations, because of separately required logistics and the respective space required for same, results in a disadvantageous waste of building space.

SUMMARY OF THE INVENTION

The object of the present invention is to provide a landing stage for ships and for helicopters, which while being of a simple structure can be used on offshore and shore installations.

That object is attained by a landing stage having the features set forth in claim 1. Advantageous configurations of the invention are set out in the appendant claims.

In accordance with the invention a landing stage has a mooring location or berth for ships and a landing area for helicopters. The landing stage is disposed in particular on offshore wind power installations, but also on installations which are erected on a bank or shore. In accordance with the invention in that case there is a common route link from the mooring location and the landing area to the installation. In that way, in accordance with the invention, logistical devices can be set up in such a way that they can be used jointly for the mooring location and the landing area. These are for example buildings in which landed people can (initially) seek protection, materials which have been landed or which are ready for

collection can be held in intermediate store, but also fuel stores which are arranged together as well as navigational aids which can include signal navigation lights, radio direction-finding transmitters, but also pilot rooms with radar surveillance. Because in particular offshore installations of any kind are substantially basically highly restricted in terms of their space aspects, a concentration in accordance with the invention of logistically relevant locations (transport interface for ships and helicopters from the installation to the outside world) is extremely advantageous. The common landing stage, preferably with the jointly usable logistical devices, advantageously concentrates in accordance with the invention transport from the landing stage by way of the common route link to the installation where then further distribution from the common route link can be effected in any desired manner in a logistically simply plannable fashion.

The landing stage according to the invention is preferably mounted to an offshore wind power installation whose generator is driven by a rotor which rotates at the tip (pod) of a pylon about a horizontal axis. In that case the landing area for helicopters, in order to guarantee safe take-offs and landings, is remote from the pylon preferably by at least a third of the length of a rotor blade.

Preferably the landing stage according to the invention has independent foundations in the sea, that is to say the mooring location and the landing area are supported on a foundation on the seabed or supported floatingly on the surface of the water, more specifically individually or separately from each other and in then any combination of the kind of support.

Preferably the landing stage is disposed laterally of the installation at the prevailing lee side of the installation. In that way the landing stage is advantageously disposed in the region of the installation which is sheltered from the wind, so that both wind and also sea swell break against the installation and only act with an alleviated force on the landing stage.

In accordance with the invention, that effect is further enhanced if the landing stage is preferably mounted rotatably about the offshore installation and is thus always oriented into the lee side of the installation by the afflux flow of wind. Particularly suitable for this embodiment of the invention is the floating foundation for the landing stage, which for example can be in the form of a pontoon of large area, which can be connected by way of a bridge for example to the base region of an offshore wind power installation and then is supported there for example by means of a ring sleeve or a rotor member on the periphery of the base. When applied to wind power installations, that design configuration has an additional substantial advantage: the greatly projecting rotating rotor blades of the generator propeller represent a major danger to a helicopter flying towards the installation. If now however in accordance with the invention the landing stage is oriented by the wind into the lee side of the wind power installation, the air space above the landing stage is at any event outside the rotational range of the generator propeller for the latter is in accordance with its function oriented transversely with respect to the lee side against the wind - in other words: in relation to the wind direction, the plane of rotary movement of the generator propeller is then perpendicularly markedly upstream of the air space above the landing stage and does not cut through the air space. Furthermore, the helicopter can advantageously come in to land on the landing area against the wind without being impeded by the installation.

The embodiment of the landing stage according to the invention with the floating foundation also has the advantage that in respect of its height it follows the movement of the tides, which is of substantial advantage for the mooring location of the ships.

The landing stage according to the invention is preferably a structure made up of any combination of steel framework, plates, concrete and/or wood with

suitable corrosion protection in relation to sea water and other environmental influences.

BRIEF DESCRIPTION OF THE FIGURES

Preferred embodiments of the invention are described hereinafter with reference to the accompanying drawings in which:

Figure 1 shows a side view of a first embodiment of the present invention, and

Figure 2 shows a side view of a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In the two Figures, identical components or components which correspond to each other in any way are denoted by the same references. With reference to Figures 1 and 2, shown therein is an offshore wind power installation 2 with a rotor 4 with a substantially horizontal axis of rotation. The rotor 4 is connected or coupled to a generator (not shown) in a pod 6. The pod 6 (or the illustrated machine housing) can be oriented about a vertical axis 8 with respect to the current wind direction 9 by a transmission arrangement (not shown) which is also arranged in the pod.

The pod 6 with the rotor 4 is mounted on the tip of a pylon 10 rotatably about the axis 8.

The pylon 10 of the wind power installation 2 is fixedly erected in the sea 12 as shown in Figure 1 by means of a foundation 14a of concrete and as shown in Figure 2 by means of lateral struts 14b on the seabed 16.

The wind power installations 2 shown in both Figure 1 and also Figure 2 each have a landing stage 20a, 20b. The landing stage 20a shown in Figure 2 is in the form of a steel framework structure with a concrete platform 22

and is secured fixedly to the pylon 10 of the wind power installation 2 laterally of the installation 2 and is fixedly supported by way of a steel lattice pillar 24 itself in the sea 12 on the seabed 16.

The horizontal concrete platform 22 at the top side forms a landing area 25 for a helicopter 26. In particular at the edge 28 of the platform 22, which is most remote from the pylon 10, the platform 22 together with the pillar 24 which projects perpendicularly downwardly from that edge 28 to the seabed 16 forms a mooring location or berth in the form of a pier for ships 30.

Both the landing area 25 for helicopters 26 and also the mooring location 28 for ships 30 are connected by way of the platform 22 which is fixed to the pylon 10 by a common route link 32 between on the one hand the landing area and the mooring location 28 and on the other hand the pylon 10 of the wind power installation 2. Thus, personnel and equipment which are transloaded by means of the helicopter 26 or the ship 30 on the landing stage 20, by way of the common route link 32, follow a common path through a door 34 into the pylon 10 where for example by means of an elevator (not shown) they can be conveyed in the pylon 10 to the pod 6 at the tip thereof, if for example repair or maintenance operations have to be carried out there.

The landing stage 20a, in relation to a prevailing wind direction at the location of the wind power installation 2, is disposed at the lee side thereof and is securely fixed there, as described. In that way, the force of wind and sea swell both against the landing area 25 and also against the mooring location 28 is broken by the pylon when wind is blowing from the prevailing direction.

Safe take-offs and landings of helicopters 26 on the landing area 25 are guaranteed by a sufficiently large vertical distance between the landing area 25 and the diameter described by the tips of the rotor blades 4.

Referring now to Figure 1 the wind power installation 2 has a landing stage 20b which differs from the landing stage 20a in Figure 2 by the features described hereinafter.

The landing stage 20b shown in Figure 1 is a steel plate/steel framework structure whose concrete platform 22 is supported on a pontoon 36. Disposed in the interior of the pontoon 36 are storage spaces (not shown). The platform 22 whose top side, as already described with reference to Figure 2, forms the landing area 25 for helicopters 26 and whose lateral edges form the mooring location 28 for ships 30, is therefore not fixedly anchored in the sea on the seabed 16 but floats on the surface of the sea 12. As a result, there is always an identical vertical spacing between the platform 22 and the surface of the sea 12, which is of substantial advantage in particular for loading and unloading ships 30.

The platform 22 with the landing area 25 and the mooring location 28 on the floating platform 36 is connected to the pylon 10 of the wind power installation 2 by way of a bridge 32. The bridge 32 thus forms the common route link from the landing area 25 and the mooring location 28 to the pylon 10 of the wind power installation 2. The bridge 32 is supported both on the pontoon 36 and also the pylon 10 firstly pivotably about a respective horizontal axis. Those mounting locations 38 ensure that the floating pontoon 36 is freely enabled to perform vertical movement by virtue of the movement of tides in the sea 12.

The landing stage 20b shown in Figure 1 is also connected by way of the bridge 32 rotatably about the vertical axis 8 of the pylon 10 of the wind power installation 2. In that way the landing stage 20b, connected to the pylon 10 by way of the bridge 32, can float freely at a given spacing around the pylon 10. In that situation it is oriented by the wind direction 9 at the time. That provides firstly that the landing stage 20b is always at the lee side of the wind power installation 2 - that is to say not only with the prevailing wind direction but with any current wind direction - and is thus always protected by the pylon 10 from the influences of wind

and swell. So that the pontoon 36 can float as smoothly as possible on the sea, structural measures are known, for example the pontoon 36 should be as heavy and as of large surface area as possible. A second advantage of the landing stage 20b being oriented by the wind 10 to assume a position in the lee of the wind power installation 2 concerns flight safety when helicopters 26 are taking off from and landing on the landing stage 20b: by virtue of the fact that the propeller 4 of the wind power installation 2 is always oriented in the wind direction 9, the airspace above the landing stage 20b, as shown in Figure 1, which is oriented towards the lee side, does not in any case have the rotor blades 4 of the wind power installation 2 passing therethrough. The helicopter 26 can thus take off and land vertically without hindrance and can fly to the landing stage 20b against the wind without being impeded by the wind power installation 2.

The described rotatable support for the landing stage 20b about the pylon 10 is afforded by an annular 'balcony' 40 which is rotatable in the form of a sleeve about a region at the lower end of the pylon 10. The balcony 40 is fixed on the pylon 10 in the vertical direction so that the door 34 in the pylon 10 is at any event always accessible from the balcony 40.

It is possible to see on the landing stage 20b buildings 42 which can be used jointly from the landing area 25 and the mooring location 28 and navigational aids 44.

From the foregoing it will be appreciated that, although specific embodiments of the invention have been described herein for purposes of illustration, various modifications may be made without deviating from the spirit and scope of the invention. Accordingly, the invention is not limited except as by the appended claims.

CLAIMS

1. A landing stage for an offshore wind power installation, comprising
a mooring location for ships,
a landing area for helicopters, and
a common route link from the mooring location and the landing area to the installation, the mooring location and landing area being on a common platform.

2. The landing stage according to claim 1 wherein the mooring location and the landing area in addition to the foundation of the installation in the sea have their own foundation.

3. The landing stage according to claim 1 wherein the landing stage is arranged at the lee side of the installation in relation to a prevailing wind direction at the location of the installation.

4. The landing stage according to claim 1 wherein the foundation of the landing stage is arranged on the seabed.

5. The landing stage according to claim 1 wherein the landing stage is supported floatingly in the sea.

6. The landing stage according to claim 1 wherein the landing stage is rotatable about the installation about a vertical axis.

7. The landing stage according to claim 1, further including: logistical and/or infrastructural items of equipment which can be jointly used at the mooring location and the landing area.

8. The landing stage according to claim 7 wherein the items of equipment are jointly usable buildings for the storage, intermediate storage and preparation of articles which are transloaded at the mooring location and/or the landing area, and/or buildings for means which serve for the supply and/or operation of the craft using the landing stage, and/or residential buildings for personnel seeking protection and/or for maintenance personnel, who travel with the craft and/or are used for movement of the craft, for example as pilots.

9. The landing stage according to claim 7 wherein the items of equipment are jointly usable navigational aids, in particular radio direction-finding transmitters, light signaling installations and/or radar equipment.

10. The landing stage according to claim 1 comprising a concrete platform at the top side, on which the landing area is arranged with the mooring location disposed at the edge thereof.

11. The landing stage according to claim 1 further including a steel framework and/or steel plate structure.

12. The offshore wind power installation according to claim 1 wherein the landing area is horizontally remote from a pylon of the wind power installation by at least two-thirds of the length of a rotor blade.

ABSTRACT OF THE DISCLOSURE

Offshore wind power installations usually require a landing stage or landing pier so that craft, in particular ships, can guarantee supply and transportation services. In the case of small offshore installations, these are usually simple jetties with possible ways of making boats fast. In the case of larger offshore installations at which larger supply ships land, the landing installations are of a more expensive and complicated structure and have for example supply intermediate storage facilities such as fuel tanks and loading equipment such as cranes.

1/2

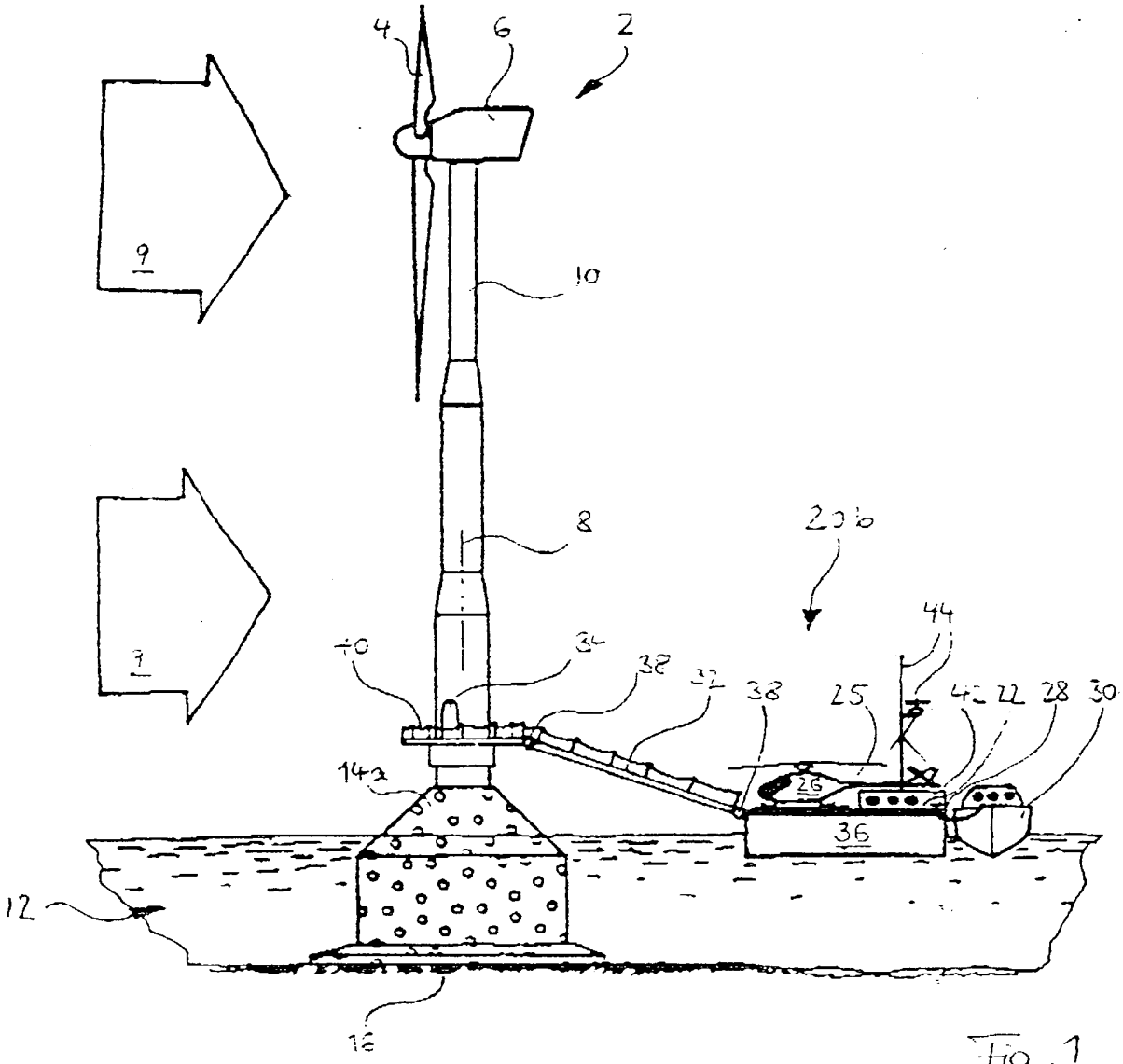

Fig. 1

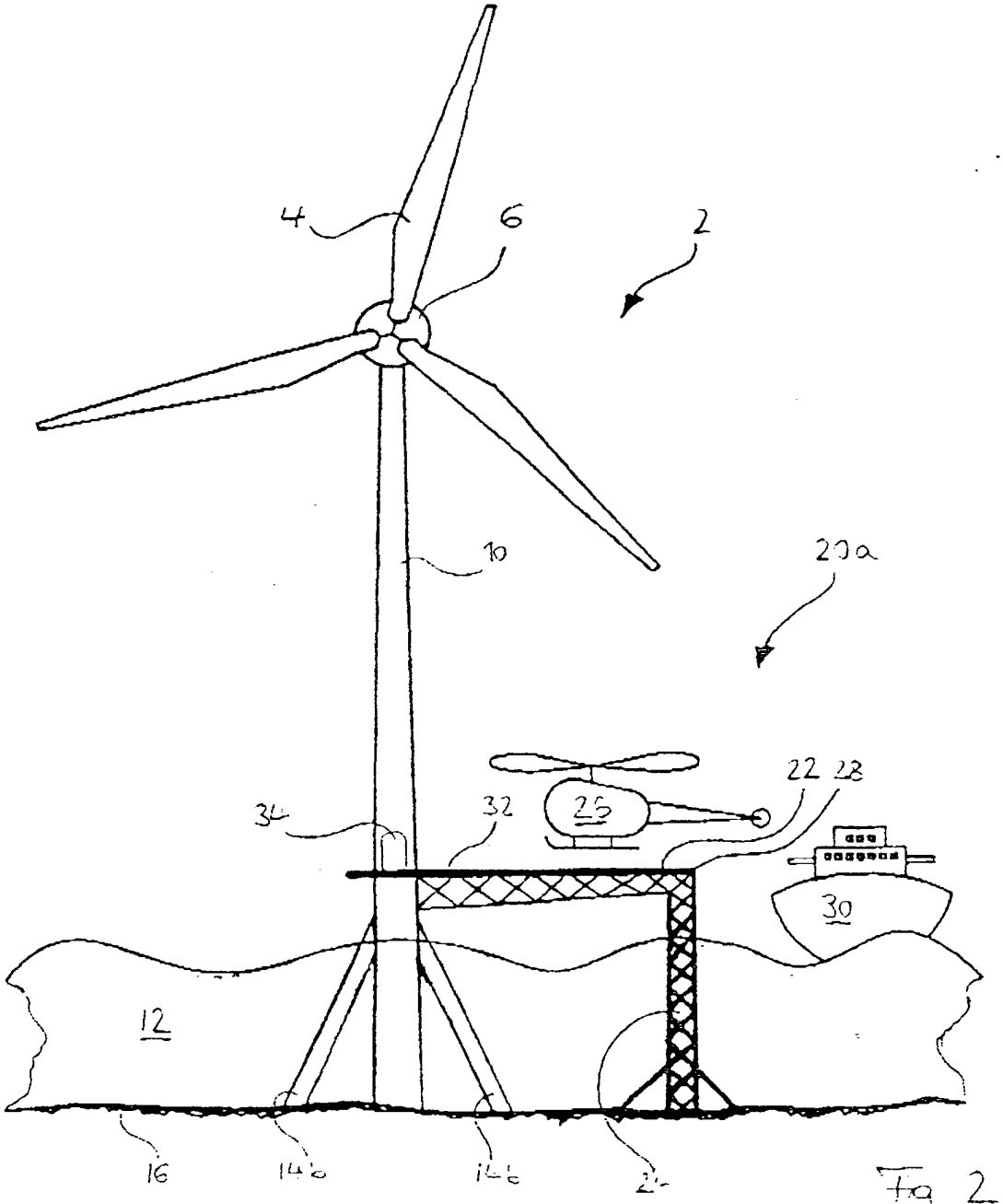

Fig 2

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ELECTION AND POWER OF ATTORNEY OR AUTHORIZATION OF AGENT		
	Application Number	10/088,947
	Filing Date	
	First Named Inventor	Aloys Wobben
	Group Art Unit	Not yet known
	Examiner Name	Not yet known
	Attorney Docket Number	970054.414USPC

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I am the:

[X] Applicant/Inventor.

[ ] Assignee of record of the entire interest. See 37 CFR 3.71.

Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

[ ] As assignee of record of the entire interest hereby elect, under 37 C.F.R. § 3.71, to prosecute the application to the exclusion of the inventor.

SIGNATURE of Applicant or Assignee of Record

Name	Aloys Wobben
Signature	X
Date	X 22 May 2002

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

[X] *Total of 2 forms are submitted.

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PTO/SB/01 (10-01) (modified)

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)		
	Attorney Docket No.	970054.414USPC
	First Named Inventor	Aloys Wöbben
	COMPLETE IF KNOWN	
	Application Number	10/088,947
	Filing Date	
[ ] Declaration Submitted with Initial Filing [X] Declaration Submitted after Initial Filing	Group Art Unit	Not yet known
	Examiner's Name	Not yet known

As the below named inventor(s), I/we hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

LANDING STAGE

(Title of Invention)

the specification of which was filed on (MM/DD/YYYY) **July 15, 2000**

the specification of which is attached hereto [ ]

as United States Application Number or PCT International Application Number **PCT/EP00/06765**

Express Mail No.

and was amended on (MM/DD/YYYY) *(if applicable)*

I/we have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

In addition, I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including material information which became available between the filing date of the prior application and the National or PCT International filing date of the continuation-in-part application, if applicable.

I/we hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Claimed	Certified Copy Attached? YES	NO
19946899.0	DE	September 30, 1999	Y		X
PCT/EP00/06765	WO	July 15, 2000	Y		X

Additional foreign application numbers are not listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

I/we hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application No.	Filing Date (MM/DD/YYYY)	Application No.	Filing Date (MM/DD/YY)

Additional provisional application numbers are not listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

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I/we hereby declare that all statements made herein of my/our own knowledge are true and that all statements made herein on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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